

## Novel Polarimetric SAR Interferometry Algorithms, Phase I

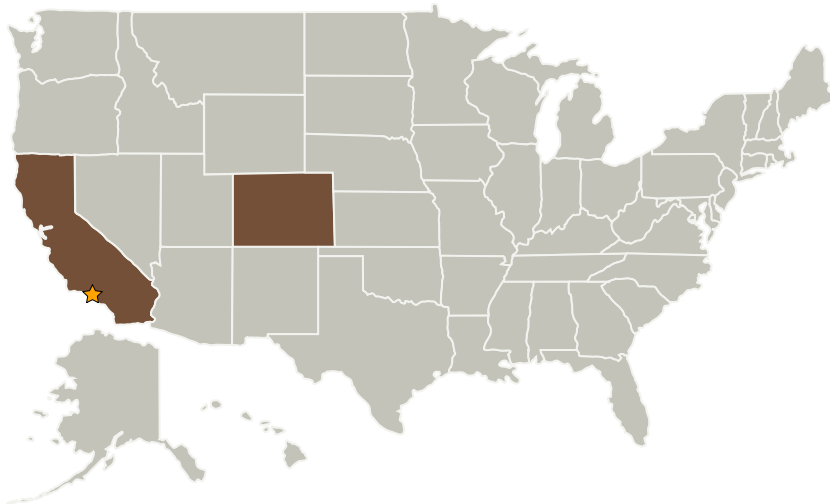
Completed Technology Project (2004 - 2004)



## Project Introduction

Polarimetric radar interferometry (PolInSAR) is a new SAR imaging mode that is rapidly becoming an important technique for bare earth topographic mapping, tree height estimation, and small-scale surface deformation monitoring in vegetated and snow covered regions. Vexcel has developed two processing techniques which may prove to be important for the successful realization of operational PolInSAR systems. First, primarily ad hoc techniques have been developed for extracting information from PolInSAR data with the result that estimated geophysical parameters have lower accuracy than necessary and associated confidence bounds cannot be computed. This is unacceptable for both scientific and commercial mapping applications. We have developed a maximum likelihood inversion formalism which yields the optimal estimates with confidence bounds. In addition, PolInSAR systems are thought to require extremely accurate calibration, possibly resulting in significant extra expense for antennas with high crosspol isolation, etc. We have developed a PolInSAR specific calibration algorithm that alleviates these problems, thereby reducing the cost of a PolInSAR system. Phase I concentrates on developing extensions to the basic techniques and theoretically validating their usefulness. Phase II focuses on experimentally validating the techniques using data from the various PolInSAR systems that will become operational in the next 1-2 years.

## Primary U.S. Work Locations and Key Partners



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Phase I

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Organizational  
Responsibility**Responsible Mission  
Directorate:**

Space Technology Mission  
Directorate (STMD)

**Lead Center / Facility:**

Jet Propulsion Laboratory (JPL)

**Responsible Program:**

Small Business Innovation  
Research/Small Business Tech  
Transfer

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Organizations Performing Work	Role	Type	Location
★ Jet Propulsion Laboratory(JPL)	Lead Organization	NASA Center	Pasadena, California
Vexcel Corp	Supporting Organization	Industry	Boulder, Colorado

## Primary U.S. Work Locations

California	Colorado
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## Project Management

**Program Director:**

Jason L Kessler

**Program Manager:**

Carlos Torrez

**Principal Investigator:**

Mark Tabb

## Technology Areas

**Primary:**

- TX11 Software, Modeling, Simulation, and Information Processing
  - └ TX11.1 Software Development, Engineering, and Integrity
    - └ TX11.1.2 Verification and Validation of Software systems